Center Innovation Fund: JPL CIF

Solid-State Magnetometer for Vectorized Field Sensing in Harsh Planetary Environments

Completed Technology Project (2015 - 2016)

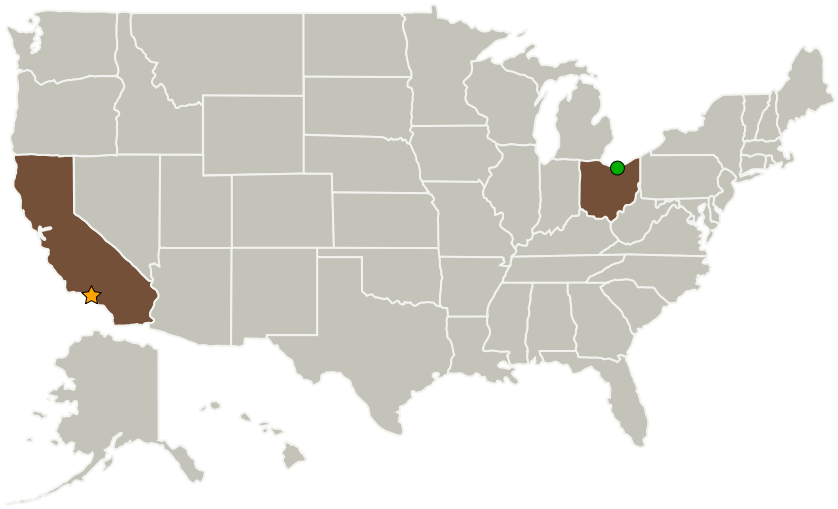
Project Introduction

Currently have a working breadboarded prototype using SiC transistors which were initially intended for high power and high temperature applications. Sensitivity is only on the uT/Hz-1/2 scale but can theoretically be pushed well below the nT/Hz-1/2 limit making them competitive with fluxgates and optically pumped atomic gas. Leverage the silicon carbide processing facilities at NASA Glenn (and Monolith Semiconductor) to evaluate performance of various, already fabricated, SiC sensors. Utilize knowledge gained from research in conjunction with defect engineering to enhance performance of future SiC sensors.

Anticipated Benefits

Potential Applications: planetary entry probes; landers; missions in extreme environments; swarms of spacecraft significantly smaller than current nanosats. Follow-On Options: Enabling of electrically detected magnetic resonance (EDMR); Only additional components: VCO, single loop coil (built into PCB); Absolute measurement. Can serve as a calibration method or magnetic field detection itself; Further boost sensitivity; Use of defect engineering to fabricate devices optimized for magnetic field sensing.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
●Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
California	Ohio

Project Website:

https://www.nasa.gov/directorates/spacetech/home/index.html

Project Management

Program Director:

Michael R Lapointe

Program Manager:

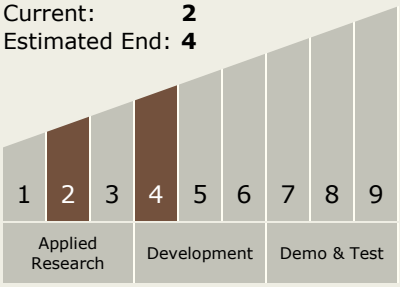
Fred Y Hadaegh

Principal Investigator:

Yuki Maruyama

Technology Maturity (TRL)

Start: **2**
Current: **2**
Estimated End: **4**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.1 Detectors and Focal Planes